

Conservation and Transformation of Energy

PS-6 The student will demonstrate an understanding of the nature, conservation, and transformation of energy.

PS-6.7 Use the formula $V = IR$ to solve problems related to electric circuits.

Taxonomy Level: 3.2-C Apply Procedural Knowledge

Key Concepts:

Ohms law: $V = IR$

Previous/Future knowledge: In the 4th grade students summarized the functions of the components of complete circuits (including wire, switch, battery, and light bulb) (4-5.6), and also illustrated the path of electric current in series and parallel circuits (4-5.7). In Physical Science students expand the concepts of voltage, current, and resistance by developing a mathematical understanding of the concept.

It is essential for students to understand

- That “V” stands for voltage, “I” stands for current, “R” stands for resistance.
- The components of an electric circuit:
 - Sources of voltage are chemical cells (a battery is a combinations of cells), solar cells, and generators.
 - Sources of resistance are resistors, light bulb filaments, and other electric devices.
- The units for:
 - *Voltage* is the volt (symbol is V).
 - *Current* is ampere or amp (symbol is A).
 - *Resistance* is ohm (symbol is Ω).

It is also essential that students are able to

- Solve problems that involve simple circuits;
- Solve for any of the variables in the equation ($V=IR$ or $I=V/R$ or $R=V/I$).

It is not essential for students to find

- Total resistance in a series or parallel circuit;
- The voltage drop across a resistance;
- The total voltage for batteries with different combinations of cells.

Assessment Guidelines:

The objective of this indicator is to use the formula $V = IR$ to solve problems related to electric circuits, therefore, the primary focus of assessment should be to apply the correct procedure to mathematically determine one of the variables in the formula, $V = I R$, for situations involving any simple circuit.

In addition to *use*, assessments may require that students

- Recognize the symbols and units for voltage, current, and resistance.